



Bioterrorism: A Public Health Issue

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Biological warfare has existed for centuries. Examples include the Mongols catapulting plague-infested bodies into Caffa to break a siege in 1346 and in 1763, blankets used by smallpox victims being given to American Indians at Fort Pitt. During World War II and the "Cold War" era, many nations, including the United States, had active biological weapons research programs, and there is evidence of some limited biological weapons use during that war. A 1972 international agreement to ban biological weapons was ratified by 140 nations, but included no verification mechanism. Evidence supports violation of this treaty. In 1979 an accidental release of anthrax in Sverdlovsk, Russia, occurred from a secret bioweapons plant. At least 66 people working or living downwind from the facility died of pulmonary anthrax. In 1992, Russian president Boris Yeltsin admitted that the Soviets had an active biological weapons program until that year. Currently at least 17 nations are believed to have offensive biological weapons programs.¹

Bioterrorism—the use of biological agents to intentionally produce disease in susceptible populations to meet terrorist aims—has become an increasing concern throughout the world, including the United States. Information on how to construct chemical or

biological weapons is available on the Internet. While still requiring a high level of expertise and financial resources, advances in biotechnology have made the production and dissemination of pathogenic organisms or chemical toxins a real possibility. For example, Aum Shinrikyo, a Japanese cult, is known for having released sarin gas in a Tokyo subway in 1995. Over 5,500 people sought medical treatment; 20 percent were hospitalized and 12 people died. The cult was found to have facilities producing both chemical and biological weapons, and had attempted the release of botulinum toxin and anthrax spores without success.

No one can say for sure how likely it is that a bioterrorist attack will occur in the United States in the next several years, though some believe it is a significant threat, particularly related to concerns regarding doomsday cult reactions to the millennium. There is agreement, however, that it is essential for the government, public health community, and medical profession to be prepared for this type of health emergency, just as it is necessary to be prepared for natural disasters. It is tempting to believe that Vermont is not at any risk for being the target of such an attack. However, it is not possible to be sure that an event will not happen here. An attack could be focused at a site considered less well prepared to respond. In addition, Vermont could be affected by an event occurring in New York City, Boston, or even distant parts of the country. Bioterrorism preparedness also

includes the ability to respond appropriately to threats such as anthrax hoaxes. Nationally, anthrax threats increased dramatically after publicity of the arrest in February, 1998 of a white supremacist who had threatened to release anthrax in Las Vegas.² Vermont was among states experiencing anthrax hoaxes this year.

Early detection of a bioterrorist attack is crucial. Some agents cause diseases that could have relatively short incubation periods, and have high mortality rates when proper treatment is not initiated early in the course of infection. Morbidity and mortality can be greatly reduced by early identification, prophylaxis of those exposed, and appropriate early treatment of the infected. For agents that can be transmitted from person-to-person, it is obviously even more crucial to identify the disease early. To detect unusual illnesses caused by intentionally

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released agents, a high index of suspicion must be maintained, and suspicious illnesses should be reported before they are confirmed. This may enable the Health Department to detect trends in what appears at first to be sporadic disease.

The initial detection of an unannounced bioterrorist attack would rely on both the diagnostic capabilities of physicians and other health care providers, and the ability of public health surveillance to detect unusual patterns of disease. The following situations could suggest a bioterrorism event, and should be reported to the Health Department:

1. Single, definitively diagnosed or strongly suspected case of illness due to a potential bioterrorist agent occurring in a patient with no known risk factor.
2. Cluster of patients presenting with a similar syndrome that includes unusual disease characteristics or unusually high morbidity or mortality without an obvious etiology.
3. **Unexplained** increase in a common syndrome above seasonally expected levels.

The CDC has listed several potential agents of particular concern, including *Bacillus anthracis* (anthrax), smallpox virus, *Yersinia pestis* (plague), *Clostridium botulinum* toxin, and *Francisella tularensis* (tularemia). Identification of these agents would be difficult because they are not expected, many have non-specific presenting symptoms, and health care providers are not familiar with them. The clinical features of anthrax and smallpox, two agents most frequently mentioned as possible bioterrorism agents, are described below. The information below is from the U.S. Army Medical Research Institute of Infectious Diseases³, and two recently published consensus statements.⁴⁻⁵

Anthrax: *Bacillus anthracis* is a rod-shaped, gram-positive sporulating organism; the spores are the usual

infective form. While primarily a zoonotic disease, human illness can occur in people working with animals or animal products. While anthrax can occur in cutaneous or gastrointestinal forms, inhalational anthrax is the chief bioterrorism concern.

After an incubation period averaging one to six days, inhalational anthrax presents as fever, malaise, fatigue, cough, mild chest discomfort and possibly vomiting or abdominal pain. This stage lasts for hours or days. In untreated patients, there may or may not be a brief period of improvement; the patient then abruptly develops severe respiratory distress with dyspnea, diaphoresis, stridor, and cyanosis. Shock and death occur within 24-36 hours after onset of severe symptoms. Physical findings are initially nonspecific; as disease progresses, the chest x-ray may reveal a widened mediastinum with or without pleural effusions. *Bacillus anthracis* can be detected by Gram stain of blood and by blood culture, but often not until late in the course of illness.

Treatment with antibiotics early in the course of symptoms is crucial; once patients have developed significant symptoms, the mortality rate is high. Most naturally occurring strains of anthrax are sensitive to penicillin, however, the possibility of a penicillin-resistant strain must be considered. A recently published consensus statement "Anthrax as a Biological Weapon: Medical and Public Health Management"⁴, recommends ciprofloxacin for treatment or prophylaxis of exposed adults and children until susceptibility to penicillin is confirmed. Anthrax is not transmitted person-to-person. Prophylaxis for those exposed to aerosolized anthrax would require a 60 day antibiotic regimen, though shorter duration may be recommended if anthrax vaccine is used in conjunction with antibiotic. For individuals involved in an incident with threatened exposure to anthrax, personal decontamination is rarely if ever needed unless the individual has had direct contact with

the substance alleged to be anthrax.

Smallpox: Smallpox was declared eradicated by the World Health Organization in 1980. Two repositories were approved to hold the remaining variola virus. These two reference laboratories are the Centers for Disease Control and Prevention (CDC) in Atlanta and a laboratory in Moscow. However, during the past several years allegations have been made that smallpox virus was weaponized in the Soviet Union, and there is concern that virus stores may have been moved to additional sites. Routine vaccination for smallpox in the United States was discontinued among civilians in 1972. The immune status of individuals vaccinated before that time is not certain, but immunity is believed to decline substantially within 10 years of vaccination. Thus, worldwide there is high susceptibility to this infection.⁵ Smallpox is caused by variola virus, which is an Orthopox virus. Transmission is person to person by respiratory discharges (droplet nuclei or aerosols), by direct contact with skin lesions, or contact with contaminated bedding or clothing. The incubation period averages 12-14 days (range 7-17 days). Individuals are not infectious until onset of rash.

Smallpox infection begins with abrupt onset of fever, malaise, rigors, vomiting, headache and backache. During this stage of illness about 10 percent of lighter-skinned patients have an erythematous rash. Lesions appear two to three days later. As opposed to chickenpox, smallpox lesions are more numerous on the face and extremities, occur on the palm, and develop synchronously. Mortality is approximately 30 percent; death is thought to occur from toxemia associated with circulating immune complexes and soluble variola antigens.⁵ Two other clinical presentations, hemorrhagic-type smallpox and flat-type or malignant smallpox, occur in approximately 10 percent of cases and have a high mortality rate. Laboratory confirmation of infection would be essential and

would need to be performed at the CDC's biosafety level 4 laboratory.

There is currently no chemotherapeutic agent known to be effective in the treatment of smallpox; only supportive care could be provided. Potential antiviral agents are undergoing investigation. Prophylaxis for individuals known to be exposed would be vaccination, which should provide some level of protection if given within four days of exposure. The supply of stockpiled vaccine in the United States is limited and estimated to be sufficient for vaccinating six to seven million people.⁵ Serious complications can occur in vaccinated individuals, requiring the use of vaccinia immune globulin (VIG). Availability of VIG is also extremely limited. Both smallpox vaccine and VIG would only be made available by the CDC through state health departments.

Conclusion

The intentional release of a biologic agent would be a public health emergency. Early detection would be essential to minimizing the impact of such an event. Clinical suspicion and prompt reporting by physicians and other health care providers of any unusual disease clusters or manifestations to the Health Department is key to the early recognition of both natural outbreaks and bioterrorist events.

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Editorial Note: Since Missouri is a transportation and tourism hub, we too need to be prepared for bioterrorist acts. See article below. In the next issue of our newsletter, we will publish some additional material describing bioterrorism preparedness activities that Missouri is involved in.

Missouri Receives Funding for Bioterrorism Preparation

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The Missouri Department of Health will be a participant in the latest national effort to prepare the United States for bioterrorism attacks.

The department will receive \$630,000 to develop a Health Alert Network, which will link public health agencies at the local level to the state health department. This will enhance the sharing of information and health data reports should the nation become the target of a terrorist attack with a biological or chemical weapon. The funds are being provided by the Centers for Disease Control and Prevention (CDC), as part of a \$40 million effort to prepare the nation for bioterrorism.

Public health will play a crucial role in protecting Missourians should we find ourselves the victim of a bioterrorist act. The protection will happen at the community level, so it is important that

communities have immediate access to the latest health and safety information.

Missouri's Health Alert Network will allow the Department of Health to develop an improved electronic communications network so information can be shared electronically in the case of an unusual disease outbreak or a confirmed bioterrorist attack. Missouri will increase its capacity to send and receive electronic information from CDC and other agencies.

The funding will support a Distance Learning Coordinator in the Office of Training and Professional Development. This person will coordinate broadcasts from the Centers for Disease Control and Prevention (CDC) and others, work with various program areas to coordinate training, and provide a central source of support, coordination and information related to distance learning.

A portion of the funds will be contracted to the Kansas City, St. Louis and Springfield health departments to

enhance their capacity to communicate with private providers and other key responders to a bioterrorism or other public threat. Each of these will support the Metropolitan Statistical Area (MSA) designated Level A local public health agencies in their area.

The Department of Health will use these funds to provide 24 hour/day/7 day a week secure direct connection Internet service to local public health agency administrators who do not have or are not satisfied with their current provider. In addition, the department will provide e-mail via its Groupwise e-mail system to all local public health agency administrators that currently do not have this capacity.

Broadcast faxing capabilities, video conferencing and computer-based training for staff development were also included in the grant. CHIME staff will be working with the local public health agencies during the coming year to accomplish the grant objectives.

Viral Gastroenteritis Caused by Norwalk-Like Viruses: What's New at the State Public Health Laboratory?

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Missouri State Public Health Laboratory

CDC estimates that viral agents cause over 30 million cases of gastroenteritis each year. Of these, an estimated 23 million are attributed to Norwalk-like viruses (NLVs). Also called small round-structured viruses, NLVs are classified in the family *Caliciviridae* and consist of a group of genetically diverse, single-stranded RNA viruses. Included in this group are Norwalk virus, Snow Mountain Agent and others.

NLVs are a significant cause of outbreaks of acute gastroenteritis. Outbreaks have been reported from swimming pools, on cruise ships, in hospitals and nursing homes, in schools and universities, in restaurants, and at catered events. While the majority of outbreaks of acute gastroenteritis can be attributed to NLVs, their role in the cause of sporadic cases is unknown. Studies in both hospital inpatients and outpatients with gastroenteritis have found that in 91 percent of the cases, no etiologic agent can be identified leading researchers to believe that NLVs are a major cause of sporadic disease also. The mode of transmission of NLVs is primarily fecal-oral through the consumption of contaminated food (especially oysters or other shellfish and salads) or water. Person-to-person transmission has also been suggested as well as possible airborne spread. Because NLVs are highly infectious, careful handwashing and attention to hygienic precautions in food preparation should always be practiced.

The incubation period for NLVs is usually 24–48 hours, but may be as short as 10 hours in common-source outbreaks. NLVs usually cause a self-limited mild to moderate illness. The symptoms may begin abruptly with vomiting, diarrhea or both and may also

include abdominal cramps, headache, myalgia, sore throat, chills or low-grade fever. Diarrhea is relatively more prominent in adults, while vomiting is more common in children. The duration of symptoms is usually only 12–60 hours. A variable number of NLV infections in an outbreak may also be asymptomatic.

Until recently, many outbreaks of NLVs went undiagnosed because there were no readily available laboratory tests for these agents. The viruses were diagnosed primarily through the use of electron microscopy, a technique unavailable to most laboratories. In Missouri, specimens from suspected NLV outbreaks were transported to the

Testing for Norwalk-Like Viral Gastroenteritis Outbreaks

Norwalk-like virus should be suspected when:

- ✓ Bacterial and parasitic agents are not detected
- ✓ The incubation period is 24–48 hours
- ✓ Vomiting occurs in at least 50% of affected individuals, and
- ✓ The average duration of illness is 12–60 hours

NOTE: Testing of specimens for the Norwalk-like virus by the Missouri State Public Health Laboratory requires prior approval from the Section of Communicable Disease Control and Veterinary Public Health.

For information on collecting and submitting samples for testing, please contact:

Section of Communicable Disease Control
and Veterinary Public Health
(573) 751-6113 or (800) 392-0272

or

Virology Section
Missouri State Public Health Laboratory
(573) 751-0633

or

Your District
Communicable Disease Coordinator

Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia. CDC has strict criteria for accepting specimens, including the minimum submission of 6-10 stools per outbreak and the additional requirement of collecting and submitting sera from the patients. This process results in failure or delay in determining the cause of the outbreak.

The Missouri State Public Health Laboratory has developed and validated a method for detecting NLVs from clinical samples. This process, known as Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR) is a highly sensitive and specific method of viral detection in outbreak situations. However, due to inhibitors to RT-PCR that may be present in some fecal specimens, this method is not recommended for diagnosis of sporadic or individual cases. As a result, it will be used to characterize outbreaks only.

The appropriate specimen for RT-PCR testing for NLVs is a fresh stool specimen collected as soon as possible after onset of symptoms, ideally within 48 hours and no later than 72 hours. Although viral particles may be shed for up to 10 days, the amount of virus present may be too small to detect later in the illness. Specimens should be collected in sterile containers without transport media and should be stored and transported to the laboratory cold. A minimum of four specimens from affected individuals in a suspected outbreak is required for testing at the State Public Health Laboratory. Please refer to specimen kit insert for complete instructions on requesting this test and submitting specimens.

The ability of the State Public Health Laboratory to offer the RT-PCR test for NLVs is a significant addition to the capabilities of the public health system to recognize and control outbreaks of the most common cause of non-bacterial gastroenteritis.

If you would like more information on this or other tests available, please contact the Missouri State Public Health Laboratory at (573) 751-3334.

Updated HIV Treatment Guidelines

Guidelines for the prevention of opportunistic infections in HIV-infected persons have been updated:

CDC. 1999 USPHS/IDSA Guidelines for the Prevention of Opportunistic Infection in Persons Infected With Human Immunodeficiency Virus: U.S. Public Health Service (USPHS) and Infectious Diseases Society of America (IDSA). MMWR 1999;48(No. RR-10)

These guidelines, along with other HIV treatment recommendations, are available on the World Wide Web at: <http://www.hivatis.org/trtgdlns.html>.

Tuberculosis Web-Based Self-Study Modules

The Centers for Disease Control and Prevention (CDC) has released web-based self-study modules on tuberculosis. This interactive course is a set of five modules covering the following topics:

- Transmission and Pathogenesis of Tuberculosis
- Epidemiology of Tuberculosis
- Diagnosis of Tuberculosis Infection and Disease
- Treatment of Tuberculosis Infection and Disease
- Infectiousness and Infection Control

The web address for the modules is <http://www.cdc.gov/phtn/tbmodules>.

Target audience includes: outreach workers, nurses, health care workers, administrators, and medical and nursing students. Participants can earn 24 continuing nursing education contact hours (CNEs) or 2.0 continuing education units (CEUs) through the on-line continuing education component of the course.

Minimum computer requirements include:

- PC with Windows 3.1 (or higher) or Power Macintosh
- 16" color monitor (256 color monitor is better)
- Internet connection—28.8 kbps or better
- Web browser—preferably Netscape Navigator version 2.0 or higher or Microsoft Internet Explorer.

Questions regarding the tuberculosis self-study modules should be directed to the Section of Vaccine-Preventable and Tuberculosis Disease Elimination at (800) 611-2912.

Missouri Department of Health Issues Alert Regarding Increases in Bacterial Disease

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Section of Communicable Disease
Control and Veterinary Public Health

On September 3, 1999 as Missouri children headed to schools and to child care centers, the Department of Health issued a news release about a recent increase in shigellosis, an infectious bacterial disease. This news release was part of a joint intervention effort by the Bureau of Child Care Safety and Licensure and the Section of Communicable Disease Control and Veterinary Public Health to resolve a statewide increase in shigellosis cases during the first six months of 1999.

During the first six months of 1999, Missouri experienced a 544 percent increase in shigellosis cases over the same time the previous year, from 57 to 367 cases. Fifty-eight percent of the cases were in children 10 years and

younger. About one-third of the cases involved children in child care. Children attending elementary schools also have been infected. Although rates have been on the decline since June, it is important to take preventive measures.

Shigellosis generally causes diarrhea with fever and nausea. Symptoms sometimes include vomiting, cramps and headache. It can be spread when an infected person fails to wash his or her hands after using the bathroom or changing the diaper of a child with the infection. Just a few particles, not necessarily visible, can be enough to transmit infection. Therefore, careful handwashing prior to food preparation or eating is also important.


Shigellosis is highly contagious and can spread rapidly through a school or a child care center. However, proper and frequent handwashing by children and


caregivers can be an effective intervention to reduce the transmission of this disease.

The Missouri Department of Health has provided a fact sheet on shigellosis for child-care centers and providers with detailed recommendations for preventing shigellosis. We are printing a copy of that fact sheet on pages 7-8 of this issue. We are also providing a general fact sheet on shigellosis on pages 9-10 that can be distributed to patients/clients, especially those who work in food service or child care.

Cases of shigellosis should be reported to your local public health agency within three days of first knowledge or suspicion. Cases can also be reported to the Section of Communicable Disease Control and Veterinary Public Health at (573) 751-6113 or (800) 392-0272.

LATE BREAKERS

 **First Influenza Cases**—On October 12, 1999, Greene County reported the first laboratory confirmed case of influenza. The case was identified as a 13-year-old female who had symptom onset October 11. The specimen was confirmed as influenza A and forwarded to the State Public Health Laboratory where it was subtyped as influenza A (H3N2). As of November 5, subsequent cases of influenza A have been reported: 2 in St. Louis City, 1 in Cape Girardeau County, 1 in St. Charles County, 1 in Taney County and 1 in Camden County. According to the Centers for Disease Control and Prevention, during September through October 29, laboratory-confirmed influenza A virus infections have been reported in 19 states. One state, Tennessee, has reported influenza B. If you have questions, please contact the Section of Communicable Disease Control and Veterinary Public Health at (800) 392-0272.

 **Meningococcal Vaccine and College Students**—On October 20, 1999, the Advisory Committee on Immunization Practices (ACIP) modified its guidelines for use of meningococcal vaccine to prevent bacterial meningitis. The modifications are particularly directed at college freshmen who live in dormitories, a group with a modestly increased risk of meningococcal disease relative to other persons their age. The ACIP guidelines are that college freshmen should be made aware of their increased risk of contracting meningitis, and all students and their parents should be informed of the availability of the vaccine.

Earlier this year, the American College Health Association recommended that all college students, especially those who live in dormitories, consider getting the vaccination. There are no Missouri statutes requiring immunizations for students at institutions of higher learning. However, colleges, universities and other such institutions may have entrance requirements. Parents and students should check with their student health service about recommendations and availability of the vaccine.

The full text of CDC's statement and information on meningococcal disease can be found at http://www.cdc.gov/ncidod/dbmd/diseaseinfo/meningococcal_college.htm. If you do not have access to the Internet and would like a copy of the statement, please contact the Section of Vaccine-Preventable and Tuberculosis Disease Elimination at (800) 699-2313.

Shigellosis Fact Sheet

What is shigellosis?

Shigellosis is a bacterial infection that affects the intestines. It is a fairly common disease.

Who gets shigellosis?

Anyone can get shigellosis but it is recognized more often in young children. Children in day care centers, travelers to foreign countries, institutionalized people and homosexuals are at greatest risk.

How are *Shigella* bacteria spread?

Shigella bacteria are found in the intestines and stool of infected people who, in turn, may contaminate food or water. The bacteria are spread by direct contact with an infected person, by eating or drinking contaminated food or water, or by contact with a contaminated object.

What are the symptoms?

People infected with the *Shigella* bacteria may have mild or severe diarrhea (often with traces of blood or mucous), abdominal cramping, fever, nausea, and vomiting. Some infected people may not show any symptoms.

How soon do symptoms appear?

The symptoms usually appear 1 to 3 days after exposure and usually last for 4 to 7 days.

When and for how long is a person able to spread shigellosis?

People with shigellosis may be able to spread the disease even after they are well. Most people pass the *Shigella* bacteria in their stool for 1 to 2 weeks. Sometimes people continue to pass the bacteria for as long as 6 weeks.

Should infected people be excluded from school or work?

People with diarrhea need to be excluded from day care, food service or any other group activity where they may present a risk to others. Most infected people may return to work or school when their diarrhea stops if they wash their hands after visits to the toilet. Foodhandlers, health care workers, children and staff in day care, must obtain the approval of the local or state health department before returning to their routine activities.

How is shigellosis treated?

Most people with shigellosis will recover on their own. Some may require fluids to prevent dehydration. Antibiotics are sometimes used to treat severe cases or to shorten the carrier phase. Antibiotics may allow foodhandlers, health care workers, institutionalized individuals, children and staff in day care, to return sooner to their routine activities.

What can be done to prevent the spread of shigellosis?

Since *Shigella* bacteria are passed in the stool, the single most important way to prevent the disease is careful handwashing after using the toilet, after diapering and before preparing food.

For more information about shigellosis, ask your physician or health care provider or contact:

**Missouri Department of Health
Section of Communicable Disease Control
and Veterinary Public Health
Ph: (573) 751-6113
or (800) 392-0272**

September 1999

Shigellosis Fact Sheet for Child Care Setting

About Shigellosis

- Shigellosis is a contagious disease that causes diarrhea, with fever and nausea. The disease can sometimes cause vomiting, cramps and headache.
- Shigellosis germs are found in the stool (feces) of a person with the disease. The shigellosis germs can get on the person's hands after using the toilet.
- You can get shigellosis by direct contact, or by placing something in your mouth that has contacted stool from a person with the disease. Very few shigellosis germs are needed to cause illness; therefore, the hands may not appear to be dirty.
- Illness usually begins 1 to 3 days after a person is exposed, but it may be as long as a week before illness occurs.
- Shigellosis is most common in children 1 to 4 years of age and is an important problem in child care centers in the United States.

How to Prevent and Stop the Spread of Shigellosis in Child Care Settings

1. Handwashing is very important in preventing shigellosis.

Proper handwashing includes the following:

- ✓ Wash your hands for 10 to 15 seconds, using soap and warm running water.
- ✓ Rub your hands vigorously together, washing the backs of hands, wrists, between fingers and under fingernails.
- ✓ Rinse hands well, dry hands with a paper towel and turn off the water using a paper towel.

Proper handwashing should be done:

- ✓ Child care staff should wash their hands after using the toilet, after changing diapers, before preparing foods or beverages or any other time their hands may become dirty.
 - ✓ Children should wash their hands after using the toilet, before eating, upon arrival, just before departing the center and any other time their hands may become dirty.
 - ✓ Children's and staff's hands must be washed after diapering.
 - ✓ Food handlers must frequently wash their hands with soap and warm running water (clean under fingernails).
2. Child care staff, food handlers and children with diarrhea should not be in the child care facility.
 3. Furniture, equipment and personal items used by children and staff must be washed, rinsed and then sanitized with a bleach solution of 100–200 ppm (approximately 1 teaspoon of bleach per gallon of water).
 4. Keep bathroom doors closed when not in use.

For more information about shigellosis, contact:

**Missouri Department of Health
Section of Communicable Disease Control
and Veterinary Public Health
Ph: (573) 751-6113
or (800) 392-0272**

September 1999

Patterns in Missouri Hospital Closings

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Bureau of Health Resources Statistics

As of October 1999, there were 124 general medical surgical hospitals to provide community care to an estimated 5,439,000 Missourians. In 1983 there were 150. In the past 15 years, 26 hospitals have closed, merged and/or changed to a different service area or function. Twenty-two (85%) of these were general medical surgical facilities. Since 1983, the number of hospital beds has decreased by over 7,600, and the discharge rate has decreased from 178 discharges per 1,000 population to 132.2 per 1,000.

Table 1 shows the characteristics for Missouri's general hospitals from 1983–98. The table does not include state, federal or specialty hospitals. Two state facilities, the University of Missouri Hospital and Clinics and the Missouri Rehabilitation Center, are included because the majority of their admissions are medical surgical patients.

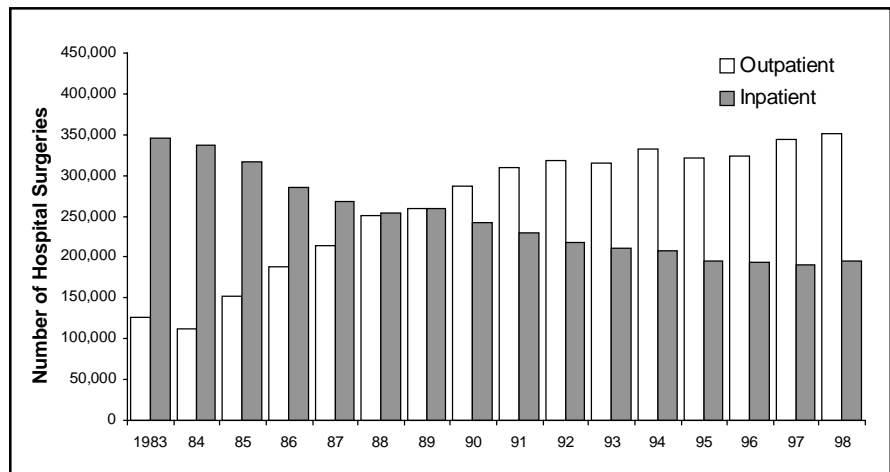


Figure 1. Number of inpatient and outpatient hospital surgeries by year, Missouri, 1983–98.

Trends to Outpatient Care

More health care services are being provided on an outpatient basis. Outpatient surgeries have steadily increased over the past 15 years. See Figure 1. In 1998, 64 percent of surgeries were performed as outpatient compared to 26 percent in 1983. There were as many outpatient surgeries in

1998 as there were inpatient surgeries in 1983. The total number of surgeries performed in Missouri hospitals in 1998 was about the same as the total number of hospital surgeries performed 15 years ago. The number of surgeries performed in hospitals has been affected by the past decade's growth of ambulatory surgery centers (ASCs). In 1983, there

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Table 1. Number of General Hospitals and Utilization Characteristics by Year, Missouri, 1983–98.

Year	Number of Hospitals	Staffed Beds	Patient Days	Staffed-Bed Occupancy Rate	Average Length of Stay	Number of Discharges	Discharge Rate Per 1,000
1983	150	27,201	6,876,900	70.9	7.7 days	885,098	178.0
1984	150	26,559	6,310,767	66.3	7.5 days	858,341	171.6
1985	146	25,123	5,736,455	63.3	7.4 days	786,259	156.1
1986	146	24,568	5,615,649	62.6	7.4 days	765,588	151.1
1987	144	24,256	5,489,552	62.0	7.5 days	734,526	143.8
1988	140	23,898	5,367,303	61.5	7.5 days	716,452	139.4
1989	137	23,605	5,384,307	62.5	7.5 days	716,465	140.5
1990	137	23,460	5,286,795	61.7	7.4 days	711,966	139.1
1991	136	23,270	5,109,877	60.2	7.3 days	693,037	134.3
1992	133	22,813	5,046,200	60.6	7.3 days	684,321	131.8
1993	131	22,994	4,912,479	58.5	7.2 days	674,798	128.9
1994	131	22,215	4,616,936	56.9	6.7 days	680,000	128.8
1995	131	20,982	4,382,022	55.9	6.4 days	683,682	128.4
1996	126	20,237	4,192,272	56.8	6.1 days	697,144	131.3
1997	125	19,844	4,053,716	56.0	5.8 days	695,992	129.8
1998	125	19,587	4,053,475	56.7	5.6 days	714,377	132.2

(continued from page 11)

were seven freestanding ambulatory surgery centers. In 1998, there were 43 reporting nearly 83,000 surgical procedures.

Inpatient Utilization is Declining

The number of hospital inpatient days continues a steady downward trend. The hospital licensed-bed occupancy rate in Missouri declined from 74 percent in 1983 to 44.8 percent in 1998. Missouri's 1998 staffed-bed occupancy average of 56.7 percent for general medical surgical hospitals continued to be higher than the United States staffed-bed occupancy average of 47 percent. Figure 2 compares the decline in the rate of hospital inpatient days for Missouri with the United States from 1983–98.

Emergency Room Visits

Emergency room utilization is highest for persons under age 15. In 1997, the rate for this age group in Missouri was 113.6 per 1,000 population. The rate for persons over age 65 was 23.9 per 1,000 population. The number of uninsured Missourians using hospital emergency rooms was 310,858 in 1997, and has not changed much in the last five years. Emergency room use rates in Missouri rose at a steady rate until 1992, and then leveled off. There was a slight increase in the 1998 rate for the total population. See Figure 3.

Reason for Hospital Closings

There are 26 fewer medical-surgical hospitals in Missouri in 1999 than there

were in 1983. Mergers and consolidation of services have changed the number of facilities providing hospital care. There are currently fewer general hospitals and more specialty hospitals. In October 1999, Missouri had two rehabilitation, 16 psychiatric, three long-term acute care and one children's orthopedic hospital. There are three pediatric medical-surgical and one hospital specifically for pediatric psychiatric care. Eleven of the hospital closures in the past 15 years have been in rural communities. Most closures occurred in the late 1980s and early 1990s. The majority of these hospitals had a small patient volume and were located near another facility. Table 2 shows some of the characteristics of the closed hospitals.

Table 2. Characteristics of General Hospitals* That Closed in Missouri, 1983–99

<u>Hospital</u>	<u>City</u>	<u>Admission Estimate Prior to Closing</u>	<u>Closing Date</u>	<u>Miles to Nearest Hospital</u>
Arcadia Valley Hospital	Pilot Knob	763	Aug. 1999	20
CareUnit Hospital	St. Louis	1,565	April 1998	10
Central Medical Center	St. Louis	2,291	Oct. 1995	5
Chaffee General Hospital	Chaffee	416	May 1991	20
Dade Co. Memorial Hospital	Lockwood	559	Jan. 1991	20
Deaconess Medical Center North	St. Louis	2,719	Feb. 1993	10
Department of Community Health	Clayton	4,512	June 1986	10
Jane Chinn Memorial	Webb City	930	June 1986	10
Keller Memorial Hospital	Fayette	376	June 1995	20
Kelling Hospital	Waverly	696	Dec. 1986	20
Levering Hospital	Hannibal	2,274	Dec. 1988	5
Martin Luther King Memorial	Kansas City	1,243	Oct. 1983	10
Menorah Hospital	Kansas City	8,979	Oct. 1995	5
Mercer Hospital	Princeton	409	Dec. 1983	20
Mercy Hospital	Mansfield	1,435	Sept. 1991	30
Pershing Regional Hospital	Marcelline	588	Sept. 1990	5
Plaza Hospital	Kansas City	125	March 1985	5
Poplar Bluff Hospital	Poplar Bluff	455	March 1987	10
Pulaski County Hospital	Waynesville	1,122	Nov. 1986	20
Robert Koch Hospital	St. Louis	357	Nov. 1983	10
St. Louis City Hospital	St. Louis	10,159	June 1985	5
St. Marys on the Mount	St. Louis	514	Jan. 1985	5
Sweet Springs Com. Hospital	Sweet Springs	427	Dec. 1991	10
University of Health Science	Kansas City	3,374	Sept. 1988	5

*Table does not include hospitals no longer operating as medical facilities due to mergers.

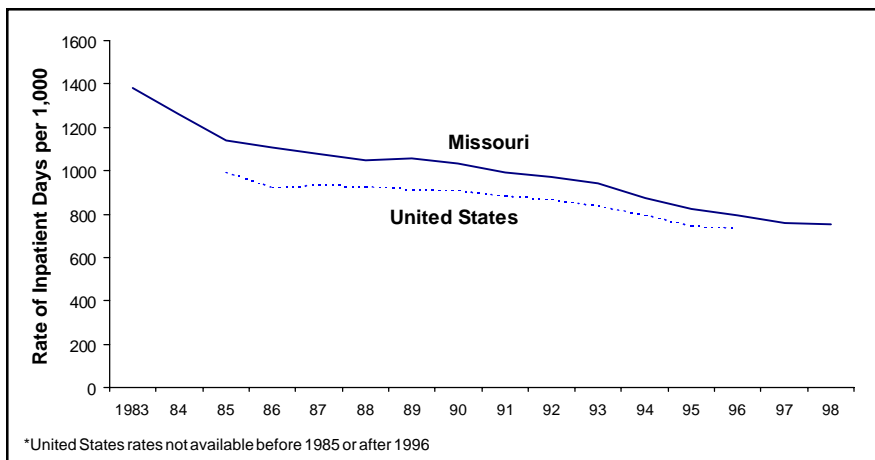


Figure 2. Rate of hospital inpatient days by year, Missouri and United States, 1983–98.

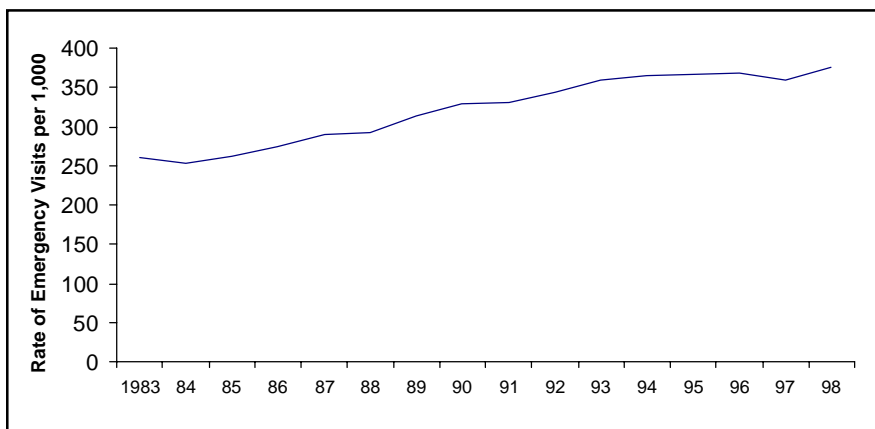


Figure 3. Rate of emergency room visits by year, Missouri, 1983–98.

Summary

Utilization of Missouri hospitals has been moving downward for some time. Inpatient days and average length of stay continue to decline. Changes in occupancy rates, duration of stay and the number of staffed beds is partly due to the increase in utilization of outpatient care. Managed care limits have affected admitting decisions and when a patient is discharged. Even though there are more people with fewer hospitals and fewer beds, occupancy continues to decline. Ambulatory surgery centers are replacing some inpatient and outpatient surgery hospital functions. New procedures, technology and home health care have reduced the need for longer hospital stays.

Vaccines for Children Update

The Section of Vaccine-Preventable and Tuberculosis Disease Elimination is pleased to announce the following changes in the Vaccines for Children (VFC) Program:

- ✓ Influenza vaccine is now available for VFC-eligible children 6 months through 18 years of age.
- ✓ Hepatitis A vaccine is now available to all VFC-eligible children 2 through 18 years of age. You may choose *Vaqta* by Merck or *Havrix* by SmithKline.

If you have questions, please call the VFC Program at (800) 219-3224.

Changes to MMWR Continuing Education Data Management System

MMWR Recommendations and Reports first published a Continuing Education (CE) component on October 16, 1998. Because of the unexpectedly large response to the program, reviewing print examinations and mailing certificates to MMWR readers have been delayed.

To address the backlog in processing previously submitted examinations, and to effectively manage a program of this size, MMWR has installed a new examination management system. The new system speeds processing of examinations submitted by mail and allows the user to complete tests and receive credit through the World-Wide Web at <http://www2.cdc.gov/mmwr/cme/conted.html>. To reduce the costs of this free service, MMWR readers are encouraged to use the online examinations. The new system will require prior users of the online system to re-register. Users who registered and took examinations online before October 21, 1999, will not be able to view their complete transcripts until the old database is merged with the new database, which should be completed by January 2000. Questions concerning the change should be sent by e-mail to the continuing education coordinator at mmwrce@cdc.gov.

Hypothermia Mortality in Missouri

Diane C. Rackers
Office of Epidemiology

Cold weather is a hazard to life in Missouri. During the past ten winters, 123 Missourians have died due to hypothermia, an average of 12 deaths per year. See Figure 1.

The rate of mortality due to hypothermia in Missouri increases sharply at older ages as seen in Figure 2. Hypothermia death rates increase with age, with the elderly at the highest risk for mortality because of physiologic changes (e.g., lack of appropriate vasoconstriction in response to cold environments, decreased basal metabolic rate, and impaired shivering mechanism) and underlying disease.¹ Limited mobility and less perception of cold are also contributing factors.

During the past ten winters in Missouri, those age 65 and over accounted for 65 (53%) of the 123 hypothermia deaths in Missouri. Of those 65 deaths, 46 (71%) were males and 19 (29%) were females. Of the 46 deaths in males, 37 (80%) were white and 9 (20%) were black. Of the 19 deaths in females, 18 (95%) were white and 1 (5%) was black. Of the 65 deaths in the elderly, 10 (15%) death certificates indicated the cause of death as alcohol related; 34 (52%) indicated no alcohol relationship and 21 (32%) indicated unknown alcohol relationship or left the field blank.

During the past ten winters in Missouri, those age 64 and younger accounted for 58 (47%) of the 123 hypothermia deaths in Missouri. Of those 58 deaths, 49 (84%) were males and 9 (16%) were females. Of the 49 deaths in males, 32 (65%) were white, 16 (33%) were black and 1 (2%) was American Indian. Of the 9 deaths in females, 4 (44%) were white and 5 (56%) were black. Of the 58 deaths in those age 64 and younger, 30 (52%) death certificates indicated the cause of death was alcohol related; 20 (34%) indicated no alcohol relationship and 8

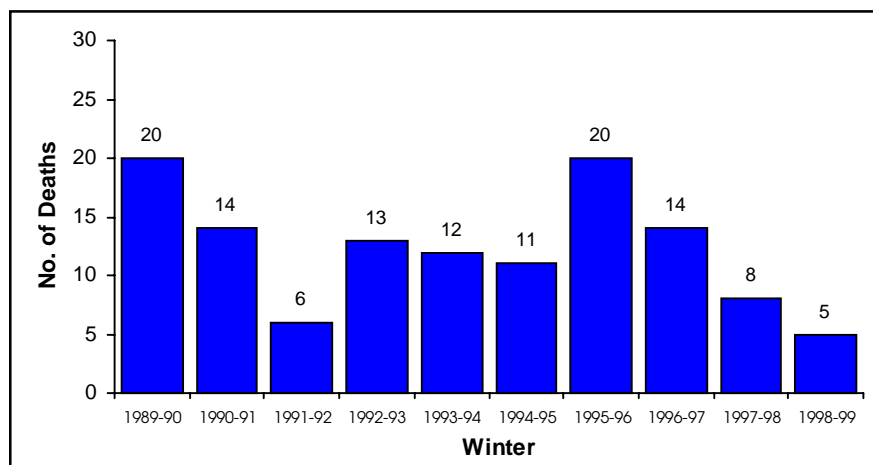


Figure 1. Recorded hypothermia deaths by winter, Missouri, 1989-90 to 1998-99.

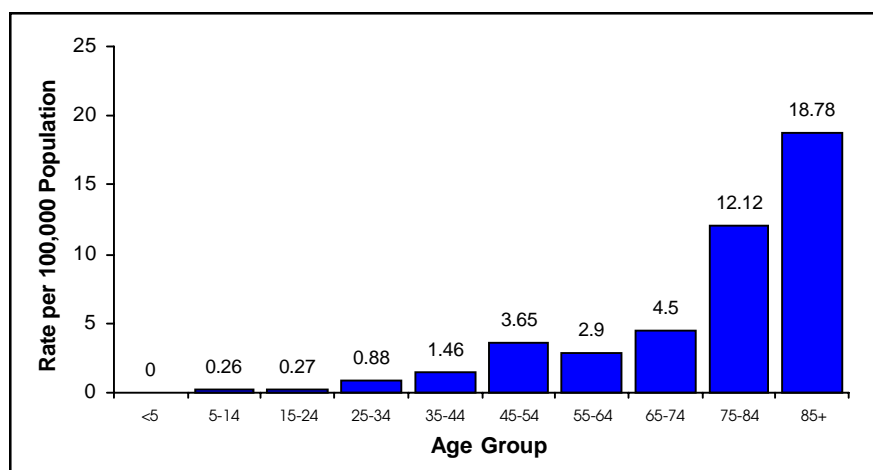


Figure 2. Rate of hypothermia deaths by age group, Missouri, 1989-90 to 1998-99.

(14%) indicated unknown alcohol relationship or left the field blank.

Location of hypothermia deaths in Missouri during the past ten winters is shown in Figure 3. Among those age 65 and over, the majority of deaths, 36 (55%), occurred in the outside environment, 19 (29%) occurred inside buildings and location is unknown for 10 (15%). The assumption that the majority of elderly die due to exposure to cold inside temperatures because they are homebound or bedfast and are trying to reduce expenditures on heating does not appear to be true for Missouri. There seems to be a need for as much concern regarding the influence of mobility, impaired mental state and alcohol

intoxication on the number of Missouri deaths due to hypothermia in the elderly.

Of the 36 elderly hypothermia deaths that occurred outside, 22 (61%) had apparently wandered outside their residence or were walking or working outside and fell, 7 (19%) wandered away from care facilities, 1 (3%) slept or passed out in a motor vehicle due to alcohol intoxication and 6 (17%) were found outside with no specifics given. Three of the outside falls were alcohol-related.

Of the 19 elderly hypothermia deaths that occurred inside buildings, 3 (16%) had fallen in a cold garage, 3 (16%) had insufficient heat in their residence, 2 (11%) were alcohol-related with no

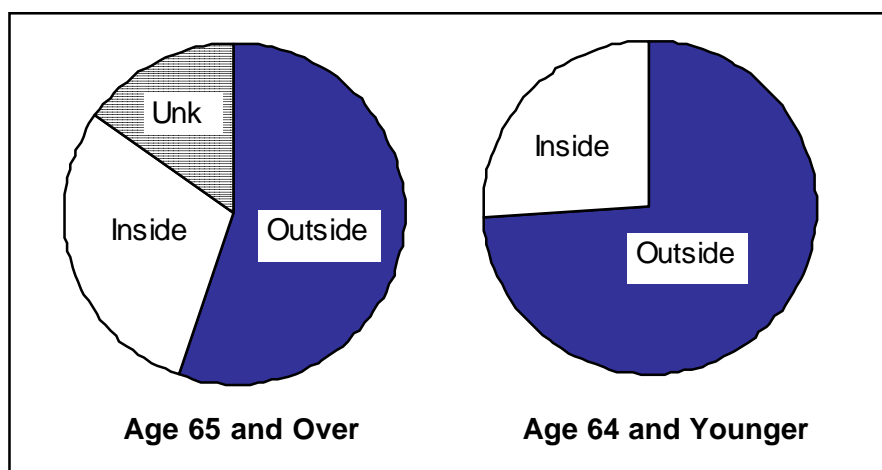


Figure 3. Location of hypothermia deaths by age category, Missouri, 1989–90 to 1998–99.

specifics given, 1 (5%) fell in a cold basement, 1 (5%) fell in their residence due to alcohol intoxication, 1 (5%) fell in their residence with no specifics given and 8 (42%) were found in their residences with no specifics given. Of the three deaths due to insufficient heat, one had run out of LP gas, one had probably turned off the heat in their residence due to alcohol intoxication and one had tipped over and shut off a space heater due to alcohol intoxication.

As might be expected, the majority, 43 (74%), of the hypothermia deaths in those age 64 and younger occurred in a cold outside environment, with only 15 (26%) occurring inside buildings. See Figure 3. There apparently is a need for concern over the number of deaths that were alcohol or drug-related in this age category. Of the 43 individuals who died outside, 22 (51%) had apparently fallen or passed out due to alcohol intoxication, 12 (28%) were walking or working outside, 3 (7%) apparently slept or passed out in their motor vehicles due to alcohol intoxication, 2 (5%) wandered away from home or got lost, 1 (2%) passed out on a porch due to methamphetamine use, 1 (2%) fell asleep or passed out in a motor vehicle due to cocaine use, 1 (2%) fell in a drainage ditch due to diphenhydramine intoxication and 1 (2%) was found outside with no specifics given.

Of the 15 hypothermia deaths in those age 64 and younger that occurred in buildings, 5 (33%) were found in vacant or condemned buildings, 3 (20%) were alcohol-related with no further details given, 1 (7%) apparently fell or passed out in the garage due to cocaine use, 1 (7%) apparently fell or passed out in a stairwell due to alcohol intoxication, 1 (7%) tipped over a space heater and shut it off due to alcohol intoxication and 4 (27%) were found in their residence with no specifics given.

Hypothermia-related morbidity and mortality can be prevented by early recognition of symptoms and prompt medical attention. Persons who are outdoors for extended periods of time during cold weather should wear insulated or layered clothing, including headgear, that does not retain moisture; maintain their fluid and calorie intake; abstain from drinking alcoholic beverages; and avoid overexertion and excessive sweating.

Increased awareness is the most effective way to prevent and treat hypothermia. Health professionals should alert their high-risk patients to the dangers of hypothermia and ways to prevent it. When prescribing medications, physicians should inform patients regarding any expected effects on core body temperature or mental confusion.

Medications reported to contribute to core temperature depressions include: acetaminophen, atropine, barbiturates, benzodiazepines, bethanechol, bromocriptine, butyrophenones, chloral hydrate, clonidine, cyclic antidepressants, glutethimide, lithium, morphine, nicotinic acid, organophosphates, phenformin, reserpine and tetrahydrocannabinol.

Doctors, nurses and other health professionals—including those working in emergency rooms—should remember to check patients for hypothermia. Relatives of patients who have mental confusion due to medications or disease or who are suffering from chronic alcoholism should be encouraged to check on their family members frequently, especially during extreme cold temperatures.

Hypothermia is reportable in Missouri. Physicians are urged to report cases promptly to their local public health agency.

Information on prevention of cold-related illness is available through the Department of Health Home Page at <http://www.health.state.mo.us/ColdAndHeat/CAndH.html>.

Disease Reporting

Cases of reportable diseases and conditions should be reported promptly to your local public health agency, or to the Missouri Department of Health at

(800) 392-0272

(during working hours)

or

(573) 751-4674

(after hours, weekends or holidays)



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The Managing Editor is H. Denny Donnell, Jr, MD, MPH, State Epidemiologist. Production Manager is Diane C. Rackers. Questions or comments should be directed to (573) 751-6128 or toll free (800) 392-0272.

Alternate forms of this publication for persons with disabilities may be obtained by contacting the Missouri Department of Health, Office of Epidemiology, P.O. Box 570, Jefferson City, MO 65102-0570, Ph: (573) 751-6128. TDD users can access the preceding phone number by calling (800) 735-2966.

IMMUNIZATION VIDEOCONFERENCE

The Section of Vaccine-Preventable and Tuberculosis Disease Elimination will sponsor the following Centers for Disease Control and Prevention (CDC) live satellite broadcast:

Epidemiology and Prevention of Vaccine-Preventable Diseases March 30, April 6, 13 and 20, 2000 (4-day course)

This live interactive program will provide the most current information available in the constantly changing field of immunization. Session one will cover principles of vaccination, general recommendations on immunization and strategies to improve immunization coverage levels. Session two will cover diphtheria, tetanus, pertussis, rotavirus and polio. Session three will cover measles, mumps, rubella and varicella. Session four will focus on hepatitis B, *Haemophilus influenzae* type b, influenza and pneumococcal disease.

This live, interactive satellite videoconference will feature question and answer sessions in which participants can address questions to the course instructors on toll-free telephone lines. Continuing education credits for a variety of professions will be offered based on 14 hours of instruction.

For more information about the course, site locations and times, contact the immunization representative located in your district health office or the Section of Vaccine-Preventable and Tuberculosis Disease Elimination at (800) 699-2313.